Effects of Informal Parental Care on Labor Force Participation in the Nordic Countries

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Preface

I am indebted to many people for their support and encouragement throught my studies.

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Special thanks go to my fellow students at the University and at NOVA. They have made each day at the office enjoyable and contributed to making this semester a great ending of my time as a student. Finally i wish to thank my family and Thomas for their encouragement and support throughout my study.

All other help though not mentioned is certainly not forgotten.

Abstract

The current and future funding of elderly care is an important issue for national budgets. The demand for care will increase vastly due to the ageing population. At the same time, the number of informal caregivers comprising mainly family members and friends is decreasing because of the demographic transition, the de-familiarization process and increased labor force participation of women. Governments are trying to find the best strategy to balance the provision of care between state, market, and relatives. There is however no consensus about the effects of informal care on labor market related outcomes. In this thesis, the effect of informal parental care on the labor force participation of caregivers in Norway, Sweden and Denmark is analyzed, using data from a longitudinal internet-based survey conducted in 2010. Caregiving is instrumented by variables related to the health status of the parents. Thereby the potential endogeneity existing between informal care and employment is controlled for. Informal parental care is generally found to be unrelated to employment. However, intensive informal parental caregivers, implying caregivers providing at least 30 hours of care per month, have a significant lower probability of being employed. There are no gender or country differences in this effect. Further, exogeneity cannot be rejected in the relationship between parental care and employment. This thesis suggests that the Nordic countries can be grouped together in informal care-related issues and that small amounts of informal care could be promoted to relax the national budget.

Contents

List of Figures

List of Tables

1 Introduction

The ageing of the population is one of the biggest challenges in European countries (Eurostat, 2000). In the Nordic countries (i.e., Norway, sweden, and Denmark), life expectancy has risen significantly in recent decades - from around 72 years in 1975 to around 80 years in 2010. Together with declining mortality rates and decreasing birth rates (SSB, SCB, and DST, 2012), the fraction of elderly in the population has increased while the number of possible caregivers in the family has declined. As these trends are expected to continue, the proportion and number of elderly, and consequently care recipients, will raise even further. For example, according to projections by the Economic Policy Committee (2011), the number of people aged 65 and over in EU 15 will raise from 61 million (16.1 percent of the total population) in 2000 to 103 million (27.5 percent) in 2050. Those aged 80 and over are projected to increase from almost 14 million (3.6 percent) in 2000 to some 38 million (10 percent) in 2050.

One important aspect of the demographic transition will therefore be the increasing need for elderly care. Care can be provided formally by paid workers or informally by family members, friends, or voluntary organizations. (For a detailed definition of care, see Chapter 2). For the case of the elderly, the OECD estimates that around 80% of all hours of care are provided informally (OECD, 2011). However, the socioeconomic trend of individualization together with declining birth rates in the Nordic countries are expected to reduce the fraction of family members being caregivers.

The two main forms of care are home care and institutional care. Institutional care is considered to be the most expensive form of care, while formal or informal home care is not only cheaper but is also regarded to fit the preferences of the elderly better (Simonazzi, 2009). Although informal care does not have a lot of direct financial costs, the opportunity cost from forgone earnings or leisure may be large (Byrne et al., 2008). Work responsibilities may be incompatible with care responsibilities (Johnson and Sasso, 2000). This may especially be the case for women, who are the main informal caregivers and who have increased their labor force participation over the last decades (SSB, SCB, and DST, 2012). The effect of caregiving on labor force participation could differ significantly between genders. This must be taken into account when formulating elder care policies. If women face stronger effects of caregiving on their labor force particiaption, the goal

of balanced labor force participation across all ages will not be achieved. Since women generally are the main caregivers, they face changing demand sequences during their life (giving care to children, elderly, etc.; Moretensen et al., 2004). There are additional concerns about having a large enough tax base to support the needs of retired citizens (e.g., Karoly and Panis, 2004; Spillman and Pezzin, 2000; Toossi, 2006). The expected increase in demand for elderly care (e.g., Yang et al., 2003; Wise, 2005; Hancock et al., 2003) will put additional pressure on the performance and funding of care (OECD, 2005).

The increasing need for elderly care is a common phenomenon in all European countries. However, there are large differences in terms of of public policies aimed to deal with this issue (Crespo, 2006). Governments are striving to find the best way to balance the provision of care between the government, the market and the family (Bettio and Plantenga, 2004). In order to develop good strategies in this respect, it is crucial to know how informal care impacts the lives of the caregivers and the ones being cared for (Carmichael and Charles, 2003a). The decisions of whether to participate in the labor market and whether to care for one's parents are interrelated for individuals with parents in need of care (Ettner, 1996; Carmichael and Charles, 1998; Bolin et al., 2007). Since the ones caring for their parents are typically around age fifty and therefore still of working age, provision of care may imply large opportunity costs (Johnson and Wiener, 2007). In addition, formal care may not be available, limiting the decision for informal caregivers (Spiess and Schneider, 2003). Cross country differences in provision of formal care are partly due to institutional differences in the labor market and with respect to care institutions. The different conditions influencing the labor market and care regimes, e.g., flexible working hours and the extent of public provision of elderly (Simonazzi, 2009) are shown in Figure 1.

For an ideal policy recommendation, all effects of elderly care in relation to employment must be taken into account (Bolin et al., 2008). This thesis will focus on one particular topic: The effect of informal parental care on labor force participation. Few studies have compared European countries in this respect, this shortage has been attributed "differences in institutional and legal frameworks, conceptual difficulties and lack of comparable data" (Bettio and Plantenga, 2004, page 86). European studies focusing on the effect of elderly care on employment are in particular still scarce (Moretensen at al., 2004). This thesis concentrates on the Nordic countries Norway, Sweden, and Denmark. These

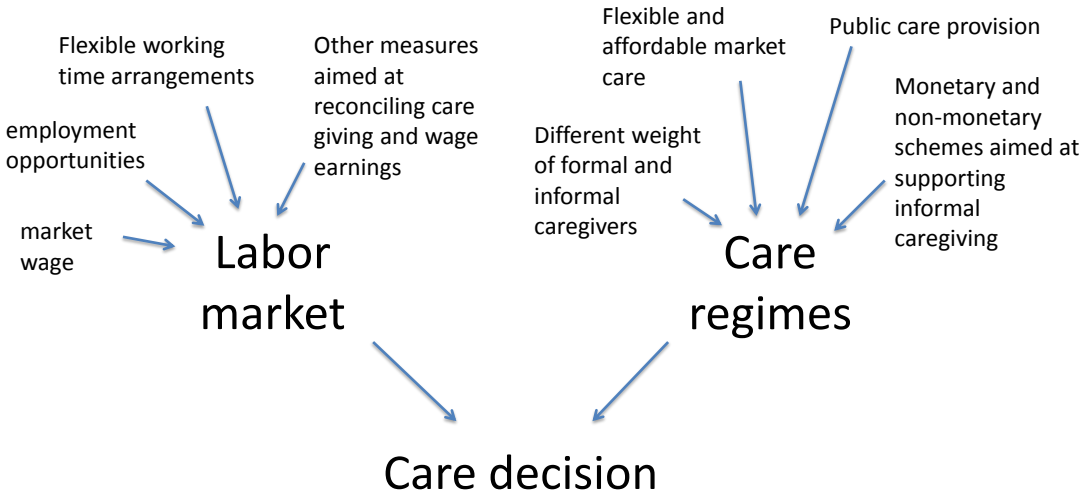

Figure 1: Opportunity cost of family caregivers and the cost of paid care; Simonazzi, 2009)

countries are considered to have similar elder care institutions (e.g., Anttonen and Sipila, 1996).

This thesis finds that parental caregiving generally has no significant negative effect on employment. Those who provide intensive care to their parents are, however, significantly less likely to be employed. No statistically significant country or gender differences were found in this respect. No endogeneity problem was found in the relationship between parental care and employment in Norway, Sweden and Denmark.

In the following, I will first give an empirical overview of gender effects of informal care on labor force participation in European countries and the US. Then the elderly care systems in Europe and the Nordic countries will be presented with a strong focus on differences between the Nordic countries. Afterwards I will introduce the theoretical background of the possible trade-off between employment and informal care. Based on a detailed description of the data, the effects of being a caregiver on the probability of being employed can be estimated with a probit regression. Further, the possible endogeneity problem will be adressed using an instrumental variable approach. Comparing the country results, I identify differences and similarities, which I then discuss on the background of the countrie's different care systems. I will then end my thesis with a discussion concerning the results and policy implications, and finally conclusions.

2 Definitions

Throughout this thesis I will use the definition of formal and informal care by Bettio and Plantenga (2004, p.86): "informal care refers to all unregulated, mostly unpaid, activities on behalf of children, elderly relatives, or others. Formal provisions of care can be defined as provisions regulated by law or other contractual arrangement." Care can be financed either by the public or privately. According to the four sectors of the "welfare diamond," the responsibilities to care are divided between: the family and informal care sector; the state or public sector; the voluntary and non-governmental sector; the care market or the private sector (Krevers et al., 2006). The different tasks of informal family care can be categorized into three groups: personal care with routine daily living activities; household work and emotional support; and administrative help (Triantafillou et al., 2010). I will use a broad definition of care that include all three groups.

Regarding labor foce participation, there is a distinction between the extensive and intensive margin of labor supply. The effect of care giving on labor market outcomes can be investigated by looking at whether caregivers are less likely to be employed because they quit their work temporarily or retired early. This is the extensive margin. The intensive margin, on the otherhand investigates whether caregivers reduce their work hours, take on fewer responsibilities, or forgo promotions in order to meet their care demands (Carmichael and Charles, 2003). It is important to look at both margins since caring could influence both current earnings and future retirement income, which implies consequences also after the period of care giving (Van Houtven, 2013). Since the information in the dataset only provides only information on current work status, this thesis focuses on the extensive margin.

3 Literature review

Lilly et al. (2007) evaluate the international research on informal caregivers from 1986 to 2006, and conclude that intensive caregivers, but not caregivers in general tend to be less likely to be employed. Additionally care givers are more likely to work less hours than non-caregivers. While there are a number of studies on informal care in the US and the UK, there are still few studies on the rest of Europe, including the Nordic countries

(e.g., Johnson and Lo Sasso, 2000; Heitmueller and Michaud, 2006; Lilly et al., 2007 and Casado et al., 2011). The results on the impact of informal caregiving on labor supply are mixed. The estimates range from large negative and statistically significant effects to no significant effects at all. Besides the fact that the data samples refer to different countries, this may be because the different studies use different definitions of the care indicators or different cutoffs for intensive care (Crespo and Mira, 2010).

Focusing on the evidence from the US and the extensive margin, there seems to be a negative relationship between care and the probability of being employed (Van Houvten et al., 2012; Pavalko and Artis, 1997; Ettner, 1995). As for the intensive margin, the results are mixed: Ettner (1996) and Johnson and Lo Sasso (2000) for example find a negative relationship between informal care and hours spent in the labor market, which is contrary Wolf and Soldo (1994), who do not find any significant effects.

Evidence from the UK suggests that caregivers are less likely than non-caregivers to be employed (Carmichael and Charles, 2003; Charmichael et al., 2010; Michaud et al., 2010). Heitmueller (2007) finds that not accommodating for endogeneity leads to an overestimation of the effects of informal caregiving on employment. He only finds negative impacts for some care types. Carmichael and Charles (2003b) and Heitmueller and Inglis (2007) find evidence of wage penalties and Parker (1990) finds losses in pensions due to informal caregiving.

Bolin et al. (2008), Crespo and Mira (2010), Kotsadam (2011), Spiess and Schneider (2003) and Viitanen (2005), compare European countries. The results of these studies are also mixed. Using the first wave of the Survey of Health, Ageing and Retirement in Europe (SHARE) database for people aged 55+, Bolin et al. (2008) divide their data into northern Europe, central Europe, and southern Europe. They find that care has a larger negative effect on employment in central Europe than in the other country groups, while wages are less affected in this group than in the other groups.

Crespo and Mira (2010) use the first two waves of the SHARE dataset. They too divide the sample into three country groups, yet only include daughters caring for their parents. They find that the effect of informal caregiving on employment is negligible in northern and central European countries but not in the southern countries.

Kotsadam (2011) uses data for women aged 20-65 from the European Community Household Panel (ECHP) for 1994-2001. He also finds that while women's employment and working hours are negatively associated with provision of informal elder care in southern Europe, being an informal caregiver is not related to employment in the Nordic countries.

Spiess and Schneider (2003) use the ECHP data from 1994 and 1996 for a sample of employed women aged 45-59, and find a significant negative relationship between starting informal care in the Northern countries (except Ireland) and work hours. Increasing informal caregiving in southern European countries and Ireland leads to a smaller increase or a higher decrease in work hours than for non-caregivers. They find no relationship between terminating a care giving commitment or reducing the amount of care hours and employment.

Viitanen (2005) uses ECHP data for a sample of women aged 20-59 from 13 European countries. Only in Germany does she find a statistically significant and negative effect of informal caregiving on labor force participation.Her results indicate a positive state dependence in the labor force participation in all countries. This means that individuals who reduce their labor force participation because of care responsibilities will continue to have a lower labor force participation even after they stop providing care.

There is substantial heterogeneity in the impact of caregiving on labor force outcome in Europe, with stronger effects for intensive caregivers (Carmichael and Charles, 2003; Casado-Marin, 2011; Heitmueller, 2007; Spiess and Schneider, 2003). In addition, using a Spanish sample, Casado-Marin et al. (2011) find that co-residential female caregivers show stronger negative effects on employment than their non-co-residential counterparts. Michaud et al. (2010) find the same effect for the UK. There is no consensus on whether the effects of caregiving are stronger for women than for men; Carmichael and Charles (2003) find stronger effects for women in the UK, whereas Jakobsson et al. (2013) do not find any differences in the Nordic countries.

The only available studies focusing on the Nordic countries, i.e., Jakobsson et al. (2013) for Norway, Sweden, and Denmark and Kotsadam (2012) for Norway, find that informal caregiving generallyl has no effect on employment and that intensive informal caregiving has negative and significant effects on labor force participation. They do not find gender differences in these effects. The study by Jakobsson et al. (2013) however does not

account for the possibility of an endogeneity bias. This thesis contributes to the research by comparing these effects in the Nordic countries Norway, Sweden, and Denmark for both men and women and controlling for a possible endogeneity bias, using the same dataset as Jakobsson et al. (2013).

4 Context

4.1 The European welfare systems

According to the European Commission and the European Council (2003), there is heterogeneity in the "availability and generosity of public formal care services and long-term care benefits" among countries in Europe. While those in southern Europe rely heavily on informal care and formal care covers only the basic needs of the very poor, the northern long-term care systems are more generous and universal. The structure of the current systems and services is connected to the origins of complex welfare, social security, and health care systems. These systems developed in different ways in terms of provision, organization, and funding. Consequently today there is a large mixture of different strategies and policies in the formal care sector (Tarricone et al., 2008). Not only are the care systems different, but also the composition of many other factors: for example, the degree of labor force attachment and the level of education also vary across countries, with a north-south divide (Crespo and Mira, 2010). The organization and division of family and market care differ also because of these compositions (Simonazzi, 2009).

Due to these differences, Anttonen and Sipila (1996) found it legitimate to divide the social care systems in Europe into social care regimes: "the Scandinavian model of public services and the southern European family care model." They suggest that the UK and central European models, forming two or three models, are not very clear cut. Riedel and Kraus (2011) divided the European countries into four clusters, depending on the use and financing of care (see Table 1). The Nordic countries are considered to be generous with accessible and formalized care. Compared with other countries, there is a low use of informal care and high public spending on formal care.

Table 1: Use and financing typology of care

Nature of the system	Countries	Characteristics
Cluster A		
Informal care oriented, low private financing	Belgium, Czech Republic, Germany, Slovakia	Low spending, low private, high IC use, high IC support, cash benefits modest
Cluster B		
Generous, accessible, and formalised	Denmark, the Netherlands, Sweden	High spending, low private, low IC use, high IC support, cash benefits modest
Cluster C		
Informal care oriented, high private financing	Austria, England, Finland, France, Spain	Medium spending, high private, high IC use, high IC support, cash benefits high
Cluster D		
High private financing, informal care seems necessary	Hungary, Italy	Low spending, high private, high IC use, low IC support, cash benefits medium

Note: IC = informal care; Source: Kraus et al. 2010

The Nordic care system is also known for its de-familiarizing approach, i.e., the intergenerational contract of the past has been replaced with a "societal contract" where the state is responsible for elderly care (Krevers, 2006). While in many countries children are legally obligated to care for their parents, this is not the case in Norway, Sweden, and Denmark (Bolin et al., 2008). The formal care services are paid by the public and are given according to individual needs with the same standards for everyone (Esping-Andersen and Korpi, 1986 and Kautto et al., 1999) to ensure that each elderly person can live a "high quality, independent life for as long as possible" (Fukushima et al., 2010). This universalistic approach implies a large variety of different public care services such as institutional care, home care and provision of assistive devices (OECD, 2011). According to Szebehely (2005), these services are "affordable by the poor and attractive for the better off." Anttonen and Sipilae (1996) therefore talk about a "social service state." Although the provision of informal care is lower in the Nordic countries than in the rest of Europe (Kraus et al., 2011), the question is whether one can group these countries together or whether there are significant differences in the effect of informal caregiving on employment outcomes.

4.2 Main Differences in Norway, Sweden and Denmark

Although the Nordic countries are very similar, there are some differences in terms of funding, coverage, service provision, and recent developments. Table 2 shows the expenditure, demography, and usage of long-term care for the elderly. Looking at the expenditures,

Sweden spends 3.2% of its GDP on long-term care, which is the highest figure among the Nordic countries. This can partly be explained by a higher proportion of elderly within its population and by a higher usage of the more expensive institutional care in Sweden. However, the coverage of home care services for people aged 65+ is higher in Denmark than in Sweden. Danish elderly receive more, albeit smaller amounts of formal care, than their Swedish counterparts: 11% of the 65+ Danish elderly receive two hours or less of home care services compared to 3.6% in Sweden. This could be because home care is targeted more to those with larger care needs in Sweden (Rostgaard and Szebehely, 2012).

Table 2: Expenditure, demography, and usage of long-term care for older people

	Norway	Sweden	Denmark
Lon- term care expenditure, (% of GDP, 2008)			
Total public expenditure	2.0	3.6	1.8
Total private expenditure	0.2		0.2
Older people in population (% of population, 2010)			
65 years +	14.8	18.1	16.3
80 years +	0.4	0.5	0.4
Public long-term care usage (% of population, 2008)			
Total use	3.9	4.2	2.5
Home care use	3.0	2.8	1.7
Institutional care use	0.9	1.4	0.8
Services for older people, coverage			
(% of population years 65+, 2008 (Sweden) and 2009 (Denmark))			
Elderly care home care services total		9.2	17.6
Of which:			
2h of help per week or less		3.6	11.0
2-20h of help per week		4.7	6.1
20h of help per week or more		0.9	0.5

Source: OECD (2011), Nordic statistical bank (2010) and Rostgaard an Szebehly (2012)

Home care (personal care and practical assistance) is not subject to co-payments in Denmark. In Norway and Sweden, municipalities can decide on small co-payments for home help within legal boundaries. Individuals earning less than a certain amount are exempt (OECD, 2011 and Fukushima et al., 2010). Rostgaard and Szebehely (2012) argue that it is cheaper in Sweden to buy formal market care when only small amounts of domestic help such as cleaning or shopping is needed. This is because user fees must be paid for publically funded care.

An important difference between the countries is that Norway and Denmark have maintained high social investments into their public care systems to both those in need for

extensive personal care and those in need for small amounts of home care. Sweden, however, has started to target those with the most need for care and the coverage of public home care has declined since the 1980s (Rostgaard and Szebehely 2012). This variation could have led to cross-country differences in the effect of caregiving on employment for informal caregivers. This suggests that Swedish caregivers might face larger negative effects of care on employment than their Norwegian or Danish counterparts.

5 Theoretical aspects of care and labor force participation

5.1 Possible effects of care on labor force participation

Providing elderly care may be linked to considerable opportunity costs (Johnson and Wiender, 2006). There are several possible effects of care provision on the labor force participation: the substitution effect, the income effect, the respite effect, and the discrimination effect.

If the caregiver is time constrained and has to divide the time between working in the labor market or giving care, there is a substitution effect. The scarcity of time may put pressure on the responsibility to provide care, which may lead to a reduction in the labor supply and an increase in care (Heitmueller, 2007). The second effect is the income effect: working less generally means earning less. The income effect implies that it is more likely that caregivers remain in the labor force if caring requires extra expenditures (Twigg and Atkin, 1994), leading to incentives to earn more by increasing labor supply (Charmichael and Charles, 2003b). Caregivers will choose not to work when the substitution effect exceeds the income effect (Do, 2008). There can also be a respite effect if the caregiver needs a break from caregiving and consequently works more than he would without the emotional demand of caring (Parker, 1993). In addition, a caregiver might lose flexibility at the workplace due to his unpredictable care duties (Leigh, 2010). This makes him less job reliable, which could cause discrimination in the labor market and hence to limited job opportunities (the discrimination effect). These limited job opportunities may lead to a depressed wage rate and lower monetary returns of work, all else equal (Heitmueller, 2007 and Charmichael and Charles, 2003b). Heitmueller and Inglis (2007) find that the

opportunity costs of working hours and wage penalties are substantial.

5.2 Trade-off between labor supply and informal care giving

Johnson and Lo Sasso (2000) provide a theoretical model of the relationship between labor supply and caregiving using a broad definition (see Chapter 2) of caregiving. Their assumptions are that individuals maximize their utility rationally (see, e.g., Becker, 1991) and are unrestricted in choice (Kooreman and Wunderink, 1997) by allocating their time of employment and elderly care optimally given their budget constraint. The variables are defined in Table 3.

Table 3: Definition of variables

Variable	Explanation
variables of the child:	
c	consumption level of the child
T	total number of hours available
h_w	number of hours in paid employment
h_k	number of hours devoted to parental care
$T - h_w - h_k$	amount of leisure
w	wage
A	non-labor income
variables of the parent:	
γ	own health
h_o	hours of parental care by other sources
p_o	price of other sources of care
functions	
u, v, x	strictly concave functions
x	the function signifies the level of utility that children derive from their parents

Individuals consider only the consumption of physical goods $u(c)$, leisure $v(T - h_w - h_k)$ and the utility of their elderly parents $x(\gamma, h_k, h_o)$ (altruistic behavior). h denotes hours and γ health of the parent. The subscript w stands for wage, k for care provided to parents and o for care provided by others. Leisure is assumed to be a normal good. The utility of the parents $x(\gamma, h_k, h_o)$ depends on the health of the parents γ and the amount of care (formal h_o and informal h_k) they receive. The utility function of the caregiving offspring is assumed to be:

$$U = u(c) + v(T - h_w - h_k) + x(\gamma, h_k, h_o) \tag{1}$$

with the two constraints:

$$c \leq wh_w + A \tag{2}$$

$$T \geq h_w + h_k. \tag{3}$$

The consumption of the caregiver is not allowed to exceed his financial resources (2). The time spent on leisure, work and care must not exceed the total amount of time available (3). Since the individual maximizes utility, equation (2) is binding, and assuming that he consumes at least some leisure, equation (3) does not bind. The solution of the maximization problem is that the individual will allocate the time such that the marginal utilities from working, enjoying leisure, and caregiving equalize.Thus, the individual works until the extra wage income from an additional hour of work is equal to the value of an additional hour of leisure and care, respectively. One implication of this is that if there is an increase in the marginal utility of caregiving, then the individual will increase his time devoted to caring and decrease leisure and work.

Below, the marginal effects are obtained to conduct comparative statistics. Below, D is the determinant of the bordered Hessian. I assume $D \leq 0$ in order to satisfy the maximization condition:

$$\frac{\partial h_w}{\partial A} = \frac{1}{|D|} w u^{''}(c)[v^{''}(\cdot) + x_{22}] < 0 \tag{4}$$

$$\frac{\partial h_k}{\partial A} = -\frac{1}{|D|} w u^{''}(c) v^{''}(\cdot) > 0 \tag{5}$$

$$\frac{\partial h_w}{\partial \gamma} = -\frac{1}{|D|} x_{21} v^{''}(\cdot) \tag{6}$$

$$\frac{\partial h_k}{\partial \gamma} = \frac{1}{|D|} x_{21}[v^{''}(\cdot) + w^2 u^{''}(c)] \tag{7}$$

$$\frac{\partial h_w}{\partial h_o} = -\frac{1}{|D|} x_{23} v^{''}(\cdot) \tag{8}$$

$$\frac{\partial h_k}{\partial h_o} = \frac{1}{|D|} x_{23}[v^{''}(\cdot) + w^2 u^{''}(c)] \tag{9}$$

$$\frac{\partial h_w}{\partial T} = -\frac{1}{|D|} x_{22} v^{''}(\cdot) > 0 \tag{10}$$

$$\frac{\partial h_k}{\partial T} = -\frac{1}{|D|} w^2 u^{''}(c) v^{''}(\cdot) > 0 \tag{11}$$

The model predicts that

- Individuals reduce their labor supply if they increase the number of care hours. This follows from the budget constraint limiting the available time and the resulting equalizations of the marginal utilities.

- If there is a change in any of the marginal utilities, the allocation of time will change for all other activities.

- If non-labor income increases, the individual will work less and increase the amount of care. There are diminishing returns on the utility of consumption, leading to reduced marginal utility of consumption. This is because the individual can now consume more without working more. Hence the individual will consume more, work less, and devote more time to care. The decrease in working hours exceeds the increase in caregiving by the absolute value of $\frac{1}{|D|}wu''(c)x_{22}$: leisure rises with an increase in non-labor income; (4) and (5). If there is a possibility of financial transfers to buy formal care (not included in the model here), it may be the case that the transfer increases but not the time devoted to care for the parent.

- Depending on the sign of $x_{21} = \partial^2 x/\partial h_k \partial \gamma$ in equations (6) and (7), parental care and health of the parents are either substitutes or complements. If x_{21} is negative, then individuals with parents who need more care will spend more time caring for their parents. If x_{21} is positive so that increasing care is more effective if the parent is in good health, then individuals will reduce their amount of care if the health of the parent declines.

- Depending on the sign of $x_{23} = \partial^2 x/\partial h_k \partial h_0$ in equations (8) and (9), parental care and other sources of care are either substitutes or complements. Other sources of care can be formal care or siblings. This relationship is discussed below.

- A reduced amount of available time reduces the time devoted to caring and work (equations 10 and 11). This could be due to own health status or caring responsibilities for own dependent children or other people in need of care such as a spouse or in-laws.

There might be irrational and restricted choices (Kooreman and Wunderink, 1997), implying that the caregiver cannot choose any combination of work and care hours. Formal elderly care can also be rationed with for example waiting lists for nursing homes. Depending on the size and structure of the caregiver's family, the care duties could also be divided by family members (Spiess and Schneider, 2004). Social norms, traditions, and institutional factors play important roles as well. Moreover, the caregiver or the elderly may prefer formal care but are not satisfied with the quality of it. A more adequate model should consider price of formal care and allow for simultaneous decisions on work and caregiving (Spiess and Schneider, 2004). According to the model, there is a negative effect of caregiving on the number of hours worked in the market. Depending on how large this effect is, this could lead to a reduced probability of being employed.

The model of Johnson and Lo Sasso (2000) does not consider the possibility of substituting own care with formal market care. Simonazzi (2009) builds a model concentrating on the decision of whether to provide informal care or buy formal care in the market. He builds on the assumption that the caregivers provides the total amount of care needed, therefore "other care" in his model is considered as formal market care purchased by the child. His model builds on constraint (2), which is modified to:

$$p_o h_o + c = w h_w + A. \tag{12}$$

The costs of formal care purchased for the parents and the amount of consumption of the individual cannot exceed total income, equation (12). The child will buy formal care if his opportunity costs are greater than the price paid for formal care and will provide informal care if the costs are smaller (Ettner, 1995). If the relative costs of formal care are reduced, the demand for it will increase. A crucial assumption is that the caregiver does not face income constraints. If there are income constraints because the amount that can be earned in the labor market is limited, the caregiver has to either reduce leisure or consumption or increase informal care (Sinonazzi, 2009).

5.3 Is informal care a substitute or a complement to formal care?

Caregivers can only substitute informal and formal care if a formal market exists and is available. In the US, Pezzin and Schone (1999a,b) and Ettner (1995,1996) show that if the

time costs of potential informal caregivers are lower than the costs of formal care, they will substitute formal for informal care. Arber and Ginn (1995) find that older individuals, those with unfavorable economic environments, and those with greater availability of formal care will do so as well. The way caregivers can decide on their allocation of time through fixed and inflexible working hours also impacts how much they can complement formal care (Simonazzi, 2009). Jakobsson, Hansen, and Kotsadam (2012) find evidence of substitutability between formal and informal care in Norway.

Since there is no country where formal care completely crowds out family care, Bonsang (2008) concludes that formal and informal care are usually complementary. He argues that in Nordic countries, formal state-provided care and family care are complements, while in other countries where formal provision is limited, families try to substitute as much formal for informal care as possible.

If the care required by the elderly person only requires simple tasks such as grocery shopping or cleaning, then formal and informal care can either be complements or substitutes. The higher the level of need and disability of the elderly, or put differently, the more qualified the task of caring for the elderly, the more likely it is that family care complements specialized health care. A higher degree of disability increases the amount of care needed and the burden it imposes on the caregivers. This may require that both informal and formal care is required to meet the needs of the elderly, where the family member provides care in order to improve the formal care services (Bolin et al., 2008 and Bonsang, 2009). Thus there is probably a stage where formal care becomes a complement to informal care when the need of the elderly is sufficiently high or the care requires a certain level of qualified care.

Bolin et al. (2008) conclude that complementarity or substitution between formal and informal care is an empirical issue. The literature on this is mixed in Europe. There are two studies focusing on the effect of public support on informal care. Using data from Norway, England, Germany, Spain, and Israel, Motel-Klingebiel et al. (2005) find no evidence of a substantial "crowding out" effect of family help. Using longitudinal data from 12 European countries, Viitanen (2007) finds that an increase in long-term care expenditures decreases informal caregiving provided outside the household. Studies focusing on the effect of informal care on the use of formal care while controlling for

endogeneity usually find that informal care substitutes for formal care. Using a sample of single-living elderly in Europe, Bolin et al. (2008) examine the effect of informal care on the use of different types of formal and medical care. They find that informal care substitutes for formal home care, while it complements doctor and hospital visits. Bonsang (2009) concludes that informal care is a substitute for long-term care as long as the care requires only simple tasks and the amount of care needed is low.

Since there is a large and generous formal care sector in the Nordic countries, I expect formal and informal care to be complements. As all elderly in need of care can easily get help in the Nordic countries, it is likely that informal care givers complement this care with actions that do not require large amounts of time or money such as helping with paperwork or grocery shopping.

5.4 Endogeneity

A caregiver might feel emotionally or morally compelled once the need for care of a relative occurs. If the caring decision hence does not depend on the economic circumstances, the decision to care is exogenous to the employment/labor market decision (Camichael et al., 2010). In this case, the caregiving indicator would enter the regression on the labor force participation as an exogenous variable directly (Crespo, 2006), which, as Ettner (1996) stated, is the simplest but less realistic option. If people for example do have an option of choice in this decision, endogeneity might occur. This is the case if the care and labor force participation choices are interrelated decisions, which Ettner (1996), Carmichael and Charles (1998), and Bolin et al. (2007) find in their research. With endogeneity, it is hard to make causal inferences such as that giving more informal health increases a person's probability of dropping out of the labor force (Carmichael et al., 2010).

Endogeneity occurs if

- the decision of informal caregiving and labor force participation are made simultaneously (Van Houtven and Norton, 2004). There might be a correlation between informal and formal care because of unobserved negative health characteristic that probably increase the demand for both formal and informal care (Charles and Sevak, 2005) or because unobserved preferences affect both types of care used (Bonsang, 2009),

- the decision of whom in the family provides informal care depends on other endogenous decision variables such as employment status of the children or number of dependent children in the family of the potential caregiver (Crespo, 2006),

- the demand for parental care is not seen as given. There is a choice of refraining from caregiving because there are alternatives such as formal market-based care or at least formal and informal care are substitutes (Crespo, 2006). The relationship between the substitution of formal and informal care is likely to differ between the types of formal care available (Van Houtven and Norton, 2004, Bolin et al., 2008), or

- the individual has unobserved characteristics that are correlated with the propensity to care for the parent and the propensity to be employed (Casado-Marín et al., 2011).

It is not certain whether there is an endogeneity problem in the Nordic countries. It might be the case that individuals there do not consider the possibility of having to care for a parent when deciding what job to take since the formal care sector is widely available and accepted. Further, it might not be the case that a family divides the care responsibilities according to decision variables, or at least the decision to have kids may not be correlated with the concern of having to care for a parent. Moreover the formal and informal sector could be complements. However, if there is endogeneity, an exogeneity assumption would lead to a bias in the estimation of the effect of informal parental care on labor force participation. The direction of the bias is a priori not clear (Crespo, 2006). An investigation of whether there is an endogeneity problem is therefore necessary.

The possible problem of endogeneity may be solved by using panel data, first differences and/or dedicated questionnaires or instrumental variables (Charmichael et al., 2010). The panel data approach was used by, e.g., Spiess and Schneider (2003) and Pavalko and Artis (1997). Carmichael et al. (2008) used a dedicated questionaire while Kotsadam (2012), Bolin et al. (2008), Heitmueller (2007), and Ettner (1996) used the instrumental variables approach. This thesis will apply the instrumental variable approach.

6 Data, Sample and Descriptive Statistics

6.1 Data

In 2010, TNS Gallup (www.tns-gallup.se) sent out a longitudinal Internet-based survey to 4,500 Danes, 4,500 Norwegians, and 3,252 Swedes aged 18–65, of whom 2,088 (46.4 %) Danes, 1,705 (52.4 %) Swedes, and 2,371 (52.7 %) Norwegians responded (in total 6,164 out of 12,252 or 50.3 %). The survey included questions about informal care, employment, and demographics. The respondents had three weeks to answer the survey and received three reminders.

Jakobsson et al. (2013) used the same dataset in their descriptive thesis "Informal eldercare and care for disabled children in the Nordic countries: prevalence and relation to employment." For more information on the data, please see their paper.

6.2 Variables

Respondents were asked about their employment status and are considered to have been employed if they were working full or part time. The respondents were asked whether they had helped a family member, relative, friend, or neighbor who needed help in everyday life due to long-term illness, disability, or old age at least once a month in the past year (see Appendix). The data has the advantage of also providing the number of care hours and not just the caregiving status. A respondent is considered to provide parental care if he spent at least 1 hour per month caring for his parents or parents in law. Intensive caregivers are individuals providing at least 30 hours of care each month. The dividing line is somewhat arbitrarily chosen and different operationalizations of intensive care will be analyzed and discussed in Section 8.5.

It would have beenbeneficial to also have data on what kind of care the parent/parent in law needed. Further, there is no information about how much care the parents/parent in law received in total and how the care was divided between formal care, informal care, and other informal care provided by other friends and relatives.

6.3 Controls

The dataset includes information aboutrespondent characteristics that are likely to influence their employment status and the time they care for their parents. These variables include age, gender, education, personal income, living in a capital, being married/cohabiting, and living with dependent children (see Table 4).

Table 4: Definition of variables

Variable	Explanation
Dependent Variables	
Employed	= 1 if employed full or part time
Main independent variables	
Parentcare	= 1 if respondent provides informal parental care
Parentintensive	= 1 if respondent provides parental care for 30h or more per month
Parentcarehours	Number of hours of informal parental care, truncated at 99 hours per month
Control variables	
Age	respondent age
Agesq	respondent age squared
Female	= 1 if female
Highed	= 1 if at least some university education
Lowed	= 1 if respondent has elementary education or less
High income	= 1 if respondent is above the 75th percentile of the national income in the dataset
Low income	= 1 if respondent is below the 25th percentile of the national income in the dataset
Capital	= 1 if living in the capital (Oslo, Stockholm or Copenhagen)
Married	= 1 if respondent is married or cohabiting
Children	number of children living in the household, truncated at 3 children
Possible Instruments	
Parentage	age of oldest parent
Parentinneed	= 1 if at least one parent needs

Education is considered to be high if the respondent had completed at least some higher education and low if he had only completed elementary education or less. I group the income variable in relation to country-specific percentiles. More exactly the variable low income contains the 25% poorest people in the country and the variable high income the 25% richest.

Studies including caregivers and non caregivers showed that older people regardless of care intensity (e.g. Carmichael et al., 2005; Dentinger and Clarkberg, 2002 Pavalko and Artis, 1997; Wakabayashi and Donato, 2005), less educated or experienced individuals

(e.g., Dentinger and Clarkberg, 2002; Pavalko and Artis, 1997; Spiess and Schneider, 2003), people with poor health (e.g., Dentinger and Clarkberg, 2002; Pavalko and Artis, 1997; Spiess and Schneider, 2003), women with young children at home (Carmichael and Charles, 2003a,b; Ettner, 1996; Wolf and Soldo, 1994), married women (Leigh, 2010) and women in general (Leigh, 2010) are more likely to exit the labor force and provide care. It is therefore important to control for these variables in order to avoid an omitted variable bias.

It would have been good to also include household income, own health, distance to parent/parent in law, and number of siblings as controls to see whether this makes a difference. However, the data set does not provide this information. The results are fairly stable when confounding factors are controlled for (see Table 8). Hence, additional control variables would probably not change the results.

6.4 Instruments

To adjust for the potential endogeneity bias, Carmichael et al. (2005) suggest using instruments that are related to the health status of the parent, with the instruments acting as a third variable. They should affect the variable employment only through the care variable in order to estimate the causal effect if care is endogenous (see Figure 2). The instrumental variable must be uncorrelated with the error term (u) consisting of the endogeneous part of the care variable. Thus, the effect of care on employment can be estimated via the instrument variable.

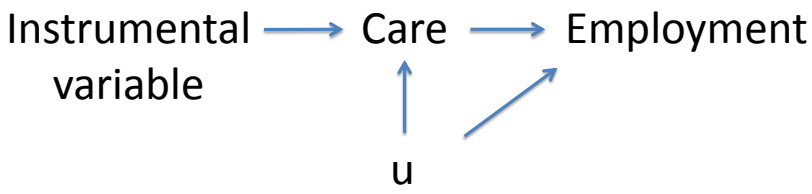

Figure 2: Instrumental variable approach (Cameron and Trivedi, 2009)

In this thesis, two instruments are considered: age of oldest parent and having a parent who is in need of help. The instruments must be valid and relevant in order to provide consistent estimators. To be valid, an instrument has to be correlated with the decision to care but uncorrelated with the dependent variable employment other than through caring

(see also Chapter 8). The relevance of the instrumental variable can be tested, yet the exclusion restrictions for validity can not be tested.

The instrument variables relate to the health of the parents. While it is likely that having parents in need of help is correlated with the caring decision (relevance), it is not likely to affect own labor participation other than through the need of having to provide care (validity) (Heitmueller, 2007; Bolin et al., 2008). Once personal age is held constant, the age of the parent is correlated with the demand for informal care (relevance) but should not have an impact on the labor market participation of the carergiver

The dataset provides only limited information about the specific care needs of the parents. It does not contain any information on how much care the parent receives in total or on whether and how much formal care services the parent gets. Furthermore, while the questionnaire concerns care for both the respondent's parents or parents-in-law it only asks about his own parents' age and need for help. As a result the instruments will exclude individuals caring for only their parents in law but not their own parents (see Section 8.3 for a discussion).

6.5 Sample and Descriptive Statistics

The sample is restricted to people aged 18-65. Table 4 gives a summary of the main variables and table 5 shows their summary statistics. The data is generally fairly representative in terms of gender and age. Looking at OECD statistics, the proportions of the respective populations are similar to those found in the dataset (compare OECD 2011, Chapter 3). However, the dataset is biased towards the more educated (around 50%, while it is around 33% according to official statistics for the studied countries, see OECD, 2013). The employment rate is fairly representative overall as well as for Norway and Denmark. However, the employment rate is biased towards employment in Sweden (compare OECD Statistics 2011). When comparing raw correlations and mean values, the bias in education should be considered. However, as education is controlled for in the regression analysis, the problem is somewhat alleviated. The employment bias in Sweden is of greater concern since it is the dependent variable. The regression can be estimated consistently; however the estimates will be less precise due to of larger standard errors (Wooldrige, 2009).

Table 5: Summary statistics of main variables

	Mean	Std. Dev.	Min	Max	Obs
Dependent variables					
Employed	0.734	0.442	0	1	6112
Main independent variables					
Parentcare	0.233	0.423	0	1	6164
Parentintensive	0.029	0.168	0	1	6164
Parentcarehours	13.542	17.885	1	99	1434
Control variables					
Age	44.187	13.572	15	65	6164
Agesq	2136.616	1152.161	225	4225	6164
Female	0.505	0.500	0	1	6164
Higheduc	0.482	0.500	0	1	6164
Loweduc	0.096	0.294	0	1	6164
High income	0.325	0.469	0	1	6164
Low income	0.324	0.468	0	1	6164
Capital	0.183	0.387	0	1	6164
Married	0.700	0.458	0	1	6164
Children	0.746	1.006	0	3	6164
Possible Instruments					
Parentage	69.291	11.977	36	100	4588
Parentinneed	0.137	0.344	0	1	6164

Around 23% of all the respondents in the three countries provide some care and 2.9% are classified as intensive caregivers. An average caregiver spends around 13.5 hours a month caring for his parents/parents in law (Table 5). Looking at the numbers for careoverall and parental care and at the differences between the countries (Table 6), 42.8% of the respondents provided care to either a partner, disabled child, parent, or other relative, friend or neighbor. Looking at the countries individually, the Danes have the highest proportion of caregivers (care overall: 46.8% ; parental care: 26.4%) and the Swedish the lowesr (37.1% and 20.9%, respectively). However, among those who provide care, Swedes on average provide the most care hours (15.83) and Danes the least (11.65).

Table 6: Descriptive statistics: care overall and parental care by country

	Obs	Care overall		Parental care	
		Share of sample	Hours/month	Share of sample	Hours/month
Total	6164	0.428	13.02	0.233	13.54
		(0.495)	(18.43)	(0.423)	(17.88)
Norway	2371	0.433	12.61	0.221	13.97
		(0.496)	(16.38)	(0.415)	(16.34)
Sweden	1705	0.371	16.40	0.209	15.83
		(0.483)	(25.11)	(0.407)	(23.63)
Denmark	2088	0.468	11.25	0.264	11.65
		(0.499)	(14.70)	(0.441)	(14.49)

Standard deviations in parentheses

Rostgaard and Szebehly (2012) also find that it is much more common in Denmark to receive help than in Sweden but that the amount of care hours is higher in Sweden. Since the questionnaire views very general tasks such as cleaning, paperwork, personal care or going outside (see Appendix) as caregiving, the numbers are higher than in other studies (e.g., Alber and Köhler, 2004). However, the Survey of Health, Ageing and Retirement in Europe (SHARE) (e.g., Ogg and Renaut, 2006) shows even larger numbers, this indicating that the numbers from the questionnaire regarding caregiving are indeed representative.

Table 7 compares the mean values for non-provider, providers, and intensiveproviders of parental care overall and by country. Overall, intensive caregivers have a significantly lower employment rate than non-intensive caregivers. In all three countries, caregivers have a significantly higher probability of beeing employed than non-caregivers. The relationship between caregiving and employment does not differ significantly between intensive caregivers and non-caregivers. Intensive caregivers are older and more likely to be women, married, and higher educated. They also have a higher income and are less likely to have dependent children. Not surprisingly, caregivers have older parents and are more likely to have parents in need of care. The age of the parent and the proportion of respondents stating that their parents need help do not increase from being a caregiver to being an intensive caregiver. This is probably due to the fact that caring for parents in law does not influence the caregiver's own parents' need for care but only the hours spent with caring for parents in law. Since the questionnaire is not precise in the distinction between own parents and parents in law, caregivers do not have older parents than intensive caregivers nor are they more likely to have parents in need of care.

Table 7: Descriptive statistics by parental care status

	Non caregiver	Caregiver	Intensive caregiver		Non caregiver	Caregiver	Intensive caregiver
Employed	0.722	0.776***	0.691*	**High income**	0.352	0.419***	0.362
Norway	0.703	0.745**	0.671	Norway	0.335	0.380**	0.328
Sweden	0.777	0.874***	0.783	Sweden	0.295	0.364***	0.386
Denmark	0.697	0.741**	0.644	Denmark	0.428	0.495***	0.386*
Parentcare hours		13.54***	52.61***	**Low income**	0.344	0.260***	0.285
Norway		13.97***	48.03***	Norway	0.356	0.318*	0.356
Sweden		15.83***	67.85***	Sweden	0.395	0.280***	0.283
Denmark		11.65***	46.52***	Denmark	0.283	0.192***	0.200
Age	42.44	49.96***	50.49***	**Capital**	0.196	0.142***	0.190
Norway	39.87	48.64***	51.45***	Norway	0.177	0.090***	0.151
Sweden	43.32	51.57***	50.11***	Sweden	0.174	0.193	0.326***
Denmark	44.75	50.16***	49.62**	Denmark	0.237	0.158***	0.133*
Agesq	1992	2612***	2678***	**Married**	0.678	0.771***	0.754*
Norway	1782	2493***	2785***	Norway	0.652	0.747***	0.699
Sweden	2060	2756***	2644***	Sweden	0.677	0.751***	0.696
Denmark	2187	2632***	2575**	Denmark	0.711	0.808***	0.867**
Female	0.498	0.528**	0.598***	**Children**	0.778	0.641***	0.525***
Norway	0.502	0.520	0.589*	Norway	0.553	0.415***	0.164***
Sweden	0.470	0.515*	0.609**	Sweden	1.268	1.207	1.217
Denmark	0.518	0.543	0.600	Denmark	0.618	0.489***	0.433*
High education	0.486	0.471	0.503	**Parent age**	66.94	77.12***	76.04***
Norway	0.583	0.562	0.534	Norway	64.98	76.07***	76.02***
Sweden	0.454	0.485	0.478	Sweden	68.43	79.47***	78.59***
Denmark	0.396	0.375	0.483*	Denmark	68.17	76.68***	73.50*
Low education	0.100	0.082**	0.101	**Parent in need**	0.073	0.349***	0.330***
Norway	0.065	0.048*	0.082	Norway	0.066	0.341***	0.342***
Sweden	0.127	0.115	0.130	Sweden	0.065	0.375***	0.435***
Denmark	0.118	0.094*	0.100	Denmark	0.090	0.341***	0.233**

*** p<0.01, ** p<0.05, * p<0.1

The findings above imply that it is important to control for individual level factors. Controlling for these factors, the correlation between informal parental care and employment probability will be lower than the around 3 percentage points. Since the countries differ in composition, I will in the following control for potential confounding differences between the countries.

Table 8 presents the he marginal effects after a probit regression for parental care and intensive parental care as well as the marginal effects of parental care hours after an ordinary least square regression. Denmark is the excluded country in the regressions, thus the variables Sweden and Norway show the difference between Denmark and the two

countries, respectively. The amount of care hours for Denmark is the constant term.

Table 8: Decriptive statistics by parental care status with controls

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	parentcare	parentcare	parentintensive	parentintensive	parentcarehours	parentcarehours
sweden	-0.053***	-0.029**	-0.002	0.002	4.172***	3.799***
	(0.013)	(0.014)	(0.005)	(0.005)	(1.210)	(1.304)
norway	-0.041***	-0.004	0.002	0.006	2.319**	2.461**
	(0.012)	(0.013)	(0.005)	(0.005)	(1.086)	(1.117)
age		0.020***		0.002		-0.452
		(0.003)		(0.001)		(0.283)
agesq		-1.45e-04***		-7.20e-06		0.006*
		(3.41e-05)		(1.24e-05)		(0.003)
capital		-0.039***		0.004		3.385**
		(0.014)		(0.006)		(1.371)
female		0.044***		0.013***		3.386***
		(0.011)		(0.004)		(0.951)
highed		-0.031***		0.001		0.062
		(0.011)		(0.004)		(1.006)
lowed		-0.012		0.007		-0.050
		(0.020)		(0.008)		(1.801)
highincome		0.008		-0.008*		-1.984*
		(0.013)		(0.004)		(1.130)
lowincome		-0.036***		-0.007		0.087
		(0.014)		(0.005)		(1.281)
married		0.030**		0.004		-1.245
		(0.013)		(0.004)		(1.224)
children		-0.015**		-0.004		-0.025
		(0.006)		(0.002)		(0.585)
Constant					11.65***	17.99***
					(0.758)	(6.239)
Observations	6,164	6,164	6,164	6,164	1,434	1,434
R-squared					0.009	0.031

Standard errors in parentheses. Marginal effects after probit regressions.
*** p<0.01, ** p<0.05, * p<0.1

When controlling for confounding factors, the relations are fairly stable. This strengthens the hypothesis that the country differences reflect compositional factors. Swedes provide significantly less care than Norwegians and Danes, while there are no statistically significant differences between the latter two countries. There are no significant differences in intensive caregiving between the countries. Columns 5 and 6 show that the number of hours devoted to care among those who provide care differs significantly between the countries.

This is in line with the literature and the findings in Chapter 4: the Danish elderly receive more, but smaller amounts of care than the Swedish (see also, e.g., Rostgaard and Szebehly, 2012 and OECD, 2011). The dataset concerns the providers of care. Since the amount of caregiving and care received generally must be the same, these numbers should be similar also when looking at informal care. The Danish respondents provide the most care when looking at giving at least some care. They provide the least amount of hours of care.

Table 9: Parental care by country

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Basic	With controls	Norway	Sweden	Denmark
sweden	-0.053***	-0.029**			
	(0.013)	(0.014)			
norway	-0.041***	-0.004			
	(0.012)	(0.013)			
age		0.020***	0.023***	0.026***	0.017***
		(0.003)	(0.007)	(0.006)	(0.005)
agesq		-1.45e-04***	-1.82e-04***	-1.95e-04***	-1.27e-04**
		(3.41e-05)	(5.45e-05)	(6.78e-05)	(6.29e-05)
female		0.044***	0.034**	0.039**	0.049**
		(0.011)	(0.017)	(0.020)	(0.020)
highed		-0.031***	-0.029	-0.013	-0.042**
		(0.011)	(0.018)	(0.020)	(0.021)
lowed		-0.012	0.009	-0.019	-0.023
		(0.020)	(0.041)	(0.031)	(0.033)
highincome		0.008	0.005	-0.006	0.013
		(0.013)	(0.021)	(0.024)	(0.023)
lowincome		-0.036***	-0.020	-0.033	-0.045*
		(0.014)	(0.022)	(0.024)	(0.027)
capital		-0.039***	-0.064***	0.006	-0.061***
		(0.014)	(0.023)	(0.025)	(0.023)
married		0.030**	0.007	0.027	0.070***
		(0.013)	(0.022)	(0.021)	(0.026)
children		-0.015**	-0.026**	-0.003	-0.027**
		(0.006)	(0.011)	(0.010)	(0.013)
Observations	6,164	6,164	2,371	1,705	2,088

Standard errors in parentheses. Marginal effects after probit regressions.
*** p<0.01, ** p<0.05, * p<0.1

Deepening the analysis to see whether there are differences across the countries in parental care, Table 9 shows the descriptive statistic with controls for each country. Married/cohabiting people and women provide significantly more care, while low educated provide less care

in Denmark than others. This is not the case in Sweden and Norway. Living in Oslo or Copenhagen is associated with providing significantly more care as opposed to not living in the capital. Respondents in Stockholm do not significantly differ in the amount of caring for their parents than other Swedes. Having a dependent child is significantly associated with providing less care in Norway and Denmark, but not in Sweden. Women and older people provide significantly more care in all countries.

7 Empirical Strategy

The empirical model consists of analyzing the relationship between informal parental care and employment. Issues addressed by the analysis are: endogeneity and different cutoffs for intensive caregiving. The approach used follows the method employed by Kotsadam (2012).

Since employment and care are binary variables, a limited dependent variable approach will be used. Only including individuals who are employed and who provide family care would lead to sample bias (Heckman, 1979). This is because caregivers who work are likely to differ from their non-working counterparts in unobservable ways (Johnson and Sasso, 2000). The effect of being a caregiver on the probability of being employed can be estimated with a probit regression:

$$I(employed = 1|X) = I(\alpha + \beta parentcare + \delta X > \epsilon)$$

Where as being *employed* is a binary variable representing employment, *parentcare* is a dummy variable equal to 1 if the individual provides care, X is a vector of control variables (see Table 4), and ϵ is the unobservable random disturbance term, which is assumed to be normally distributed. The employment variable is binary, and by using a probit model the estimable equation is

$$Pr(employed = 1|X) = G(X\delta).$$

Here $G(X\delta)$ is the standard normal cumulative density function. The care variable is now included in the vector X.

The question of whether individuals work less in order to provide care or rather take on care responsibilities due to lack of employment opportunities is not clear cut. If the

decision is endogenous, i.e., the reasoning goes in both directions so that the distinction between the dependent and independent variable is uncertain (Gujarati, 2003), there will be a correlation between the error term with the explanatory variables, i.e. ,$Cov(X, \epsilon) \neq 0$, which contradicts the crucial assumption of $E(X|\epsilon) = 0$. This leads to biased and inconsistent estimates. It is therefore not possible to have an approach with labor supply as the dependent variable on the left side and informal care as the independent variable of interest on the right hand side of the equation, as this would give biased effects of caregiving on labor force participation (e.g., Johnson and Sasso, 2000; Bolin et al., 2007; Doty et al., 1998).

To adjust for this problem, an instrumental variable (IV) approach is used. Amemiya (1978, 1979) introduced this method, which is more efficient than many other two-stage estimators in simultaneous equation models with limited dependent variables, especially if there is a small sample and weak instruments (Lee, 1991). In the first stage, the endogenous explanatory variable parental care/intensive parental care is treated as a linear function of the two instruments *parentage* and *parentinneed* and the exogenous control variables. The second stage uses the predictions of the endogenous variable as an explanatory variable in the main equation.

8 Results

First the results of an ordinary probit regression are presented, followed by the results of using the IV method with one and two instruments.

8.1 Normal Regression

Table 10 showa the marginal effect of being a caregiver or intensive caregiver and the effect of care hours from the probit regression. Controlling for confounding factors, there is no statistically significant relationship between employment and caregiving. This also holds when looking at the individual countries: the relationship is not statistically different from zero in any of the Nordic countries. There is a small negative significant relationship between intensive parental caregiving and employment. An intensive caregiver has an 8.7 percentage point lower probability of being employed. These findings are in line with the

literature: Focusing on European countries Kotsadam (2011) finds no effect of providing informal elderly care on the probability of being employed in the Nordic countries, and looking at Norway and differencing between care and intensive care, Kotsadam (2012) finds that only providing substantial care is related to employment in Norway.

Table 10: Effect on employment

	(1)	(2)	(3)
VARIABLES	Parentcare	Parentintensive	Parentcarehours
Care X	-0.019	-0.087**	-0.002***
	(0.015)	(0.038)	(5.94e-04)
sweden	0.130***	0.130***	0.133***
	(0.014)	(0.014)	(0.025)
norway	0.039***	0.040***	0.014
	(0.014)	(0.014)	(0.025)
age	0.088***	0.088***	0.082***
	(0.003)	(0.003)	(0.007)
agesq	-9.93e-04***	-9.92e-04***	-8.94e-04***
	(3.74e-05)	(3.73e-05)	(8.14e-05)
female	-0.007	-0.007	0.002
	(0.012)	(0.012)	(0.023)
highed	0.052***	0.052***	0.041*
	(0.013)	(0.013)	(0.024)
lowed	-0.073***	-0.072***	-0.066
	(0.024)	(0.024)	(0.046)
highincome	0.152***	0.151***	0.106***
	(0.013)	(0.013)	(0.025)
lowincome	-0.135***	-0.135***	-0.084***
	(0.015)	(0.015)	(0.032)
capital	0.013	0.014	-4.18 e-04
	(0.015)	(0.015)	(0.033)
married	-0.014	-0.014	-0.043
	(0.013)	(0.013)	(0.027)
children	-0.007	-0.007	0.019
	(0.007)	(0.007)	(0.015)
Observations	6,112	6,112	1,416

Standard errors in parentheses. Marginal effects after probit regressions.
*** p<0.01, ** p<0.05, * p<0.1

Table 11 contains the results for intensive care in the different countries. Overall, there is a significant negative effect of being an intensive caregiver in the nordic countries on the probability of being employed (Column 1). However, the results are insignificant when limiting the dataset to the specific countries: intensive caregiving has no statistically

significant effect on the probability of being employed in Norway, Sweden, or Denmark individually (Columns 2-4), and there furthermore are no differences between the countries with respect to this effect (Column 5).

Table 11: Employment by country

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Parentintensive	Norway	Sweden	Denmark	Care dummies
parentintensive	-0.087**	-0.046	-0.096	-0.096	-0.114*
	(0.040)	(0.058)	(0.083)	(0.069)	(0.065)
sweden	0.130***				0.130***
	(0.013)				(0.013)
swedintense					0.023
					(0.088)
norway	0.040***				0.038***
	(0.014)				(0.014)
norintense					0.037
					(0.066)
age	0.088***	0.091***	0.067***	0.095***	0.088***
	(0.003)	(0.005)	(0.005)	(0.006)	(0.003)
agesq	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(3.56e-05)	(6.36e-05)	(5.92e-05)	(6.57e-05)	(3.56e-05)
female	-0.007	-0.007	2.35e-04	-0.025	-0.007
	(0.012)	(0.020)	(0.019)	(0.022)	(0.012)
highed	0.052***	0.095***	0.003	0.037	0.052***
	(0.013)	(0.022)	(0.020)	(0.023)	(0.013)
lowed	-0.072***	-0.131**	-0.056*	-0.071*	-0.072***
	(0.022)	(0.051)	(0.032)	(0.037)	(0.022)
highincome	0.151***	0.065**	0.157***	0.237***	0.151***
	(0.013)	(0.026)	(0.020)	(0.022)	(0.013)
lowincome	-0.135***	-0.132***	-0.096***	-0.192***	-0.135***
	(0.016)	(0.026)	(0.023)	(0.033)	(0.016)
capital	0.014	-0.012	0.016	0.005	0.014
	(0.015)	(0.028)	(0.022)	(0.026)	(0.015)
married	-0.014	0.023	-0.002	-0.097***	-0.014
	(0.014)	(0.025)	(0.020)	(0.026)	(0.014)
children	-0.007	0.009	-0.025***	0.002	-0.007
	(0.008)	(0.014)	(0.008)	(0.015)	(0.007)
Observations	6,112	2,329	1,705	2,078	6,112

Robust standard errors in parentheses. Marginal effects after probit regressions.
*** p<0.01, ** p<0.05, * p<0.1

Kotsadam (2012) and Jakobsson et al. (2013) present similar results for Norway and Norway, Sweden and Denmark respectively. The European literature generally finds heterogeneity in the impact of caregiving on employment, with a stronger negative effect for

intensive caregivers (e.g., Charmichael and Charles, 2003b; Casado-Marín et al., 2011; Heitmueller 2007; Spiess and Schneider, 2003).

The effect of being a female [intensive] caregiver on employment does not statistically differ from being a male [intensive] caregiver in any of the regressions. The same can be said about married/cohabiting women, capital inhabitants, high-educated and high-income individuals compared with their counterparts (results are available on request). This is in line with the findings of Jakobsson et al. (2013) for Norway, Sweden and Denmark.

Summarizing the results, there is no significant correlation between employment and being a caregiver in general. However, intensive caregivers are significantly less likely to be employed, and there are no specific differences between the countries in this respect.

8.2 IV Regression with two Instruments

As discussed, there is a possible endogeneity problem. To tackle this problem, an IV approach is used with two potential instruments: the age of the oldest parent and whether at least one of the parents is in need of care. Validity has been discussed above. I will now investigate whether the instruments are relevant.

The AGLS regression is shown in Table 12. Column 2T shows the first stage of the regression. Having a parent in need for help is highly significant and correlated with intensive parental care in the expected direction. This indicates that the instrument is relevant. Yet the second instrument, parental age, is not different from zero and is hence insignificant and not relevant. Thus the age of the parent cannot be used as an instrument for intensive parental care as it fails the relevance criterion.

Table 12: Employment, *parentintensive* treated as endogeneous: two instruments

	(1)	(2)	(3)	(4)
VARIABLES	employed	parentintensive	athrho	lnsigma
parentintensive	0.874			
	(1.262)			
sweden	0.393***	0.008		
	(0.068)	(0.006)		
norway	0.123**	0.007		
	(0.059)	(0.006)		
age	0.293***	-9.71e-04		
	(0.014)	(0.001)		
agesq	-0.003***	1.79e-05		
	(1.62e-04)	(1.81e-05)		
female	-0.056	0.013***		
	(0.049)	(0.004)		
highed	0.150***	0.005		
	(0.052)	(0.005)		
lowed	-0.309***	0.009		
	(0.079)	(0.010)		
highincome	0.542***	-0.006		
	(0.066)	(0.006)		
lowincome	-0.400***	-0.002		
	(0.058)	(0.006)		
capital	0.005	0.006		
	(0.058)	(0.006)		
married	-0.006	0.003		
	(0.053)	(0.006)		
children	-0.023	5.22e-04		
	(0.025)	(0.002)		
parentage		8.85e-05		
		(4.92e-04)		
parentinneed		0.052***		
		(0.009)		
Constant	-5.326***	-0.002	-0.179	-1.911***
	(0.281)	(0.035)	(0.193)	(0.046)
Observations	4,556	4,556	4,556	4,556

Robust standard errors in parentheses. Coefficients after AGLS regression.
*** p<0.01, ** p<0.05, * p<0.1

8.3 IV Regression with one instrument

Only one of the potential instruments passed the relevance criterion. The instrument left is whether parents are in need of help. The results of the AGLS regression with one instrument are shown in Column 2 and 3 of Table 13. The probit coefficients in Column 1 are shown for comparison. The controls in the probit and the second stage of the AGLS

regression are almost the same. In the IV method, the effect of the variable parentintensive is reduced and the standard errors are increased, making the variable insignificant.

Table 13: Employment, *parentintensive* treated as exogenous and endogenous

	(1)	(2)	(3)	(4)	(5)
VARIABLES	employed	employed	parentintensive	athrho	lnsigma
parentintensive	-0.272**	-0.037			
	(0.114)	(1.401)			
sweden	0.488***	0.487***	0.004		
	(0.055)	(0.056)	(0.006)		
norway	0.137***	0.136***	0.007		
	(0.048)	(0.050)	(0.006)		
age	0.301***	0.300***	3.75e-04		
	(0.010)	(0.011)	(0.001)		
agesq	-0.003***	-0.003***	5.66e-06		
	(1.21e-04)	(1.24e-04)	(1.33e-05)		
female	-0.024	-0.027	0.013***		
	(0.040)	(0.044)	(0.004)		
highed	0.178***	0.178***	0.001		
	(0.043)	(0.044)	(0.005)		
lowed	-0.228***	-0.230***	0.006		
	(0.066)	(0.067)	(0.009)		
highincome	0.560***	0.561***	-0.008		
	(0.055)	(0.056)	(0.006)		
lowincome	-0.437***	-0.435***	-0.006		
	(0.048)	(0.050)	(0.006)		
capital	0.049	0.047	0.006		
	(0.051)	(0.052)	(0.006)		
married	-0.049	-0.050	0.005		
	(0.047)	(0.047)	(0.005)		
children	-0.025	-0.024	-0.003		
	(0.023)	(0.024)	(0.002)		
parentinneed			0.042***		
			(0.009)		
Constant	-5.516***	-5.507***	-0.015	-0.039	-1.800***
	(0.209)	(0.224)	(0.022)	(0.232)	(0.036)
Observations	6,112	6,112	6,112	6,112	6,112

Robust standard errors in parentheses. Coefficients after Probit/AGLS regression.
*** p<0.01, ** p<0.05, * p<0.1

Using an IV approach always increases the standard errors:

$$Avar(\hat{\beta}_{IV}) = \frac{\sigma^2}{n\sigma^2_{care}} \frac{1}{\rho^2_{care,parentinneed}} \geq \frac{\sigma^2}{n\sigma^2_{care}} = Avar(\hat{\beta}_{OLS}). \tag{13}$$

The inflation of the standard error with instrumental variables depends on the correlation

between the instrument and the dependent variable:

$$R^2_{care,parentinneed} = \hat{\rho}^2_{care,parentinneed} < 1. \tag{14}$$

The first stage regression (Column 3) indicates the relevance of our instrument. The variable *parentinneed* is highly statistically significant but small. The F-statistic is $F(1, 6100) = 44.96$. The general rule set by Staiger and Stock (1997) is that an F above 10 indicates a good instrument and this is clearly the case here. Additionally, the instrument points in the expected direction and therefore strengthens its validity. Using the Smith–Blundell test, we cannot reject that parental intensive care is exogenous since we have $\chi = 0.006$ and $p = 0.94$. Other tests such as the Wu-Hausman or the Durbin-Wu-Hausman test after a two-stage least-squares regression (2SLS) do not reject the null hypothesis of exogeneity either. This contributes to the literature suggesting that intensive caregiving does not have an endogeneity problem (e.g., Kotsadam, 2012). In their review paper, Lilly et al. (2007) conclude that nopapers using valid IV estimators find evidence of endogenous labor force participation (Bolin et al., 2007 and Heitmueller, 2007).

Table 14 compares the general AGLS regression in Columns 1-4 with the results for the specific countries: Norway in Columns 5-8, Sweden in Columns 9-12, and Denmark in Columns 13-16. The variable *parentintensive* is not significant in any of the regressions and has large standard errors, especially for Denmark. In all countries except Denmark, the instrument passes the relevance criterion. This could be because in Denmark informal care provision is not related to the need of one's parents as individuals who need care get help for free. Thus, care could be more of a complement in Denmark than in the other countries.

Exogeneity can not be rejected in any of the regressions. This could be because formal care is widely available and hence individuals do not adjust their employment behavior before they actually face someone in need of help. If one's parents do need help, the care decision probably influences employment but not vice versa.

Table 14: Employment, *parentintensive* treated as endogeneous: one instrument

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	General				Norway				Sweden				Denmark			
VARIABLES	employed	parentintensive	athrho	lnsigma	employed	parentintensive	athrho	lnsigma	employed	parentintensive	athrho	lnsigma	employed	parentintensive	athrho	lnsigma
parentintensive	-0.037				-0.985				1.472				0.504			
	(1.401)				(1.845)				(1.676)				(6.803)			
sweden	0.487***	0.004														
	(0.056)	(0.006)														
norway	0.136***	0.007														
	(0.050)	(0.006)														
age	0.300***	3.75e-04			0.283***	-0.001			0.286***	4.99e-05			0.302***	0.004**		
	(0.011)	(0.001)			(0.021)	(0.002)			(0.035)	(0.002)			(0.072)	(0.002)		
agesq	-0.003***	5.66e-06			-0.003***	3.28e-05			-0.003***	4.09e-06			-0.003***	-3.84e-05*		
	(1.24e-04)	(1.33e-05)			(2.75e-04)	(2.61e-05)			(3.82e-04)	(2.63e-05)			(7.93e-04)	(2.10e-05)		
female	-0.027	0.013***			-0.010	0.015**			-0.027	0.013			-0.086	0.008		
	(0.044)	(0.004)			(0.069)	(0.007)			(0.085)	(0.008)			(0.083)	(0.007)		
highed	0.178***	0.001			0.288***	-0.004			0.019	-0.003			0.107	0.016*		
	(0.044)	(0.005)			(0.071)	(0.008)			(0.087)	(0.008)			(0.146)	(0.008)		
lowed	-0.230***	0.006			-0.354**	0.016			-0.222*	0.001			-0.221**	0.006		
	(0.067)	(0.009)			(0.144)	(0.021)			(0.118)	(0.014)			(0.108)	(0.013)		
highincome	0.561***	-0.008			0.205**	-0.003			0.797***	0.003			0.849***	-0.027***		
	(0.056)	(0.006)			(0.087)	(0.009)			(0.159)	(0.010)			(0.108)	(0.010)		
lowincome	-0.435***	-0.006			-0.397***	-0.004			-0.377***	-0.006			-0.566***	-0.004		
	(0.050)	(0.006)			(0.077)	(0.009)			(0.098)	(0.010)			(0.144)	(0.012)		
capital	0.047	0.006			-0.030	0.010			0.022	0.026**			0.023	-0.010		
	(0.052)	(0.006)			(0.087)	(0.010)			(0.114)	(0.013)			(0.104)	(0.008)		
married	-0.050	0.005			0.070	0.001			-0.005	-0.003			-0.355**	0.030***		
	(0.047)	(0.005)			(0.077)	(0.009)			(0.088)	(0.009)			(0.181)	(0.011)		
children	-0.024	-0.003			0.022	-0.006*			-0.102***	-0.002			0.012	-0.008*		
	(0.024)	(0.002)			(0.047)	(0.003)			(0.038)	(0.003)			(0.071)	(0.005)		
parentinneed		0.042***				0.050***				0.070***				0.014		
		(0.009)				(0.016)				(0.020)				(0.012)		
Constant	-5.507***	-0.015	-0.039	-1.800***	-5.025***	0.011	0.145	-1.783***	-4.932***	0.002	-0.305	-1.836***	-5.236***	-0.070**	-0.130	-1.802***
	(0.224)	(0.022)	(0.232)	(0.036)	(0.387)	(0.041)	(0.319)	(0.055)	(0.637)	(0.049)	(0.292)	(0.069)	(1.299)	(0.036)	(1.135)	(0.061)
Observations	6,112	6,112	6,112	6,112	2,329	2,329	2,329	2,329	1,705	1,705	1,705	1,705	2,078	2,078	2,078	2,078

Robust standard errors in parentheses. Coefficients after AGLS regressions.
*** p<0.01, ** p<0.05, * p<0.1

The regression excludes respondents with healthy parents who care for their parents in law because the instrument is a "parent in need of help" and not "parent or parent in-law in need of help." The IV estimator can only find local average treatment effects (LATE), but not average treatment effects (Imbens and Angrist, 1994). Therefore the effect of intensive caregiving is only revealed for the who care for their parents/parents in law and who have own parents in need of care (compliers) but not for "never takers" (those who would never care for their parents) or "always takers" including individuals with parents who do not need care but who care for their parents in-law.

8.4 Gender effects

I did not find any gender differences in the effect of parental care on employment (see Section 8.1). No comparable European study investigated gender differences (i.e., Bolin et al., 2008; Crespo and Mira, 2010; Kotsadam, 2011; Spiess and Schneider, 2003; Vittanen, 2005), with all except one study (Bolin et al., 2008) restricting the data to women. While country studies in the US (e.g., Van Houvten et al., 2012) and in the UK (e.g., Charmichael and Charles, 2003b; Heitmueller and Inglis, 2007) have found gender differences in employment, Kotsadam (2012) did not find any in Norway.

A possible reason why no gender differences in effects are found in the Nordic countries could be that they have more positive attitudes towards gender equality (Jakobsson and Kotsadam, 2013) and that labor market opportunities are more equal for men and women (compare OECD, 2012). Using ECHP data, Bettio and Planenga (2004) found that the gender gap in care provision was smallest in Denmark when comparing 14 European countries (Norway and Sweden were not included). Jakobsson and Kotsadam (2013) found no differences between Sweden and Norway regarding views on sharing household responsibilities equally.

The reason I did not find any gender differences could also be data related: Part of the care hours reported by married men could actually be carried out by their wives. It could also be the case that the number of male caregivers in the data is too small to detect statistically significant effects (577 of the 6,164 respondents are intensive parental male caregivers).

8.5 Different operationalizations of intensive care

Being an intensive caregiver has a negative effect on the probability of being employed in the Nordic countries. However, the classification was somewhat arbitrarily defined as providing care at least 30 hours a month. Looking at different operationalizations of intensive care in the probit estimation in Table 15 reveals that providing care less than "5 hours or more a month" has no negative significant effect. Figure 3 shows the marginal effects with the confidence intervals from Table 15. Comparing the different coefficients, the relationship when increasing the number of care hours does not change as much as one would expect. From caring 15 to 35 hours or more a month, the coefficients are essentially the same while standard errors are increasing. This could indicate that the effect of caregiving is very small. Only looking at women, the effect increases with care intensity, yet men and women do not statistically significantly differ in this effect (results are available on request). There were furthermore no country differences between the different operationalizational levels.

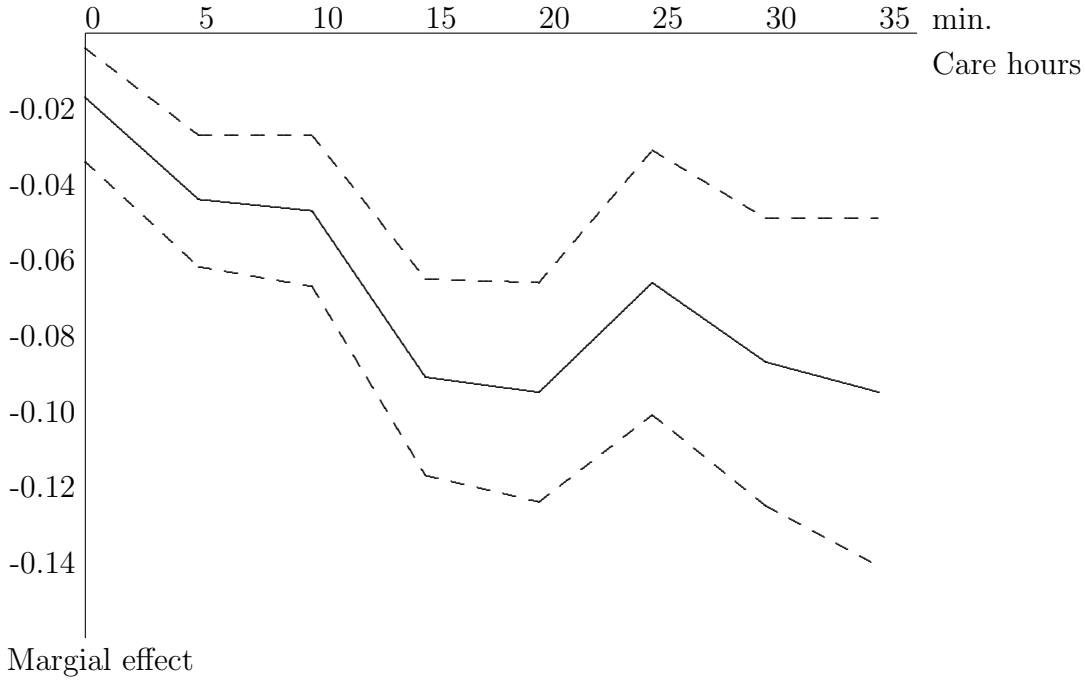

Figure 3: Marginal effects of different operationalizations of intensive caregiving

Another explanation could be that the question asked abour care is very vague. The definition of givingcare in the dataset includes going for a walk with the parents or doing some paperwork during weekends. This type of caregiving should not have any or only small effects on the probability of being employed. Personal daily care such as helping

the parent get dressed, which probably implies considerable time commitments during the week, could have larger effects. It is not possible to disentangle these different forms of care in the dataset. Assuming that the stable relationship between caring 20 hours or more and caring 35 hours or more comes from helping with administrative or small amounts of household work, the results seem reasonable.

Table 15: Different operationalizations of intensive care and its effect on employment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	5 hours	10 hours	15 hours	20 hours	25 hours	30 hours	35 hours
parentintensiveX	-0.044**	-0.047**	-0.091***	-0.095***	-0.066*	-0.087**	-0.095**
	(0.017)	(0.020)	(0.026)	(0.029)	(0.035)	(0.038)	(0.046)
age	0.089***	0.088***	0.088***	0.088***	0.088***	0.088***	0.088***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
agesq	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(3.73e-05)	(3.73e-05)	(3.73e-05)	(3.73e-05)	(3.73e-05)	(3.73e-05)	(3.73e-05)
female	-0.006	-0.007	-0.005	-0.005	-0.007	-0.007	-0.007
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
highed	0.051***	0.051***	0.051***	0.052***	0.052***	0.052***	0.052***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
lowed	-0.074***	-0.073***	-0.072***	-0.072***	-0.072***	-0.072***	-0.072***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
highincome	0.152***	0.151***	0.151***	0.151***	0.151***	0.151***	0.151***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
lowincome	-0.135***	-0.135***	-0.135***	-0.135***	-0.135***	-0.135***	-0.135***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
capital	0.013	0.013	0.013	0.013	0.014	0.014	0.014
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
married	-0.013	-0.014	-0.014	-0.015	-0.015	-0.014	-0.014
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
children	-0.007	-0.007	-0.007	-0.008	-0.007	-0.007	-0.007
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
sweden	0.130***	0.130***	0.130***	0.131***	0.130***	0.130***	0.130***
	(0.014)	(0.014)	(0.0135)	(0.014)	(0.014)	(0.014)	(0.014)
norway	0.040***	0.040***	0.041***	0.041***	0.040***	0.040***	0.040***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Observations	6,112	6,112	6,112	6,112	6,112	6,112	6,112

Standard errors in parentheses. Marginal effects after probit regressions.
*** p<0.01, ** p<0.05, * p<0.1

9 Conclusion

Using data from an internet survey in 2010, this thesis finds no significant effects of informal parental care on employment regardless of intensity. This may be due to the fact that care is defined very broadly. Intensive poroviders of informal parental care

are however significantly less likely to be employed in all Nordic countries. No gender and country differences were found in this relationship, suggesting that these countries are very similar in this respect. There is no evidence of an endogeneity problem in the relationship between provision of informal parental care and employment in the Nordic countries. Thus, reversed causality should not be a problem in this relationship. This means that the labor market decision is not influenced by a possible future care obligation.

Regarding policy recommendations, the results suggest that promoting small amounts of informal care (up to 5 hours a month) could help release the financial pressure of the demographic transition without reducing the tax base or harming the goal of balanced labor force participation. Support for informal carergivers should be targeted to those described as intensive caregivers to help them better combine work and care duties. Decision makers should consider the opportunity costs of intensive providess of informal care. One example of opportunity costs is a reduced employment probability. Consequences of a lower employment probability include limited job opportunities with depressed wage rates and lower returns of work, as well as lower pension entitlements in the future. Eldercare arrangements can therefore have profound economic, social, and psychological implications.

The results from this thesis should be considered in the context of current and proposed policy changes in all three countries. A recent trend affecting the care sector in Denmark for example is that more emphasis is put on self-care and on preventive and health-promoting activities (Schulz, 2010). It is therfore crucial to follow the developments of eldercare policies in the three countries further to see whether they start to move in different directions.

Since people probably first adjust their working hours before deciding to not work at all, it would have been good to also have data on work hours to see how large the effects are in the intensive margin, especially because working hours are more flexible in the Nordic countries than in the rest of Europe (e.g., Brewster et al., 1997 reviewing the literature on flexible working in Europe). Panel data to investigate whether caregivers retire early and whether there are effects of starting and ending a care commitment would also be helpful. There are no studies on whether there is a difference between short-term and long-term informal caregiving in the Nordic countries. Using a sample from Spain,

Casado Marína et al. (2011) found that caregiving lasting longer than one year has negative effects on employment while starting caregiving does not. Further, it would be good to also investigate whether different forms of informal care, such as weekend or weekday help, have different effects on employment. It would be interesting to look at the total amount of care a person receives to see whether formal and informal care are used more as substitutes or complements, and which forms of informal care are provided the most in the Nordic countries. To my knowledge, there is no comparable study on gender differences in the effect of informal care on labor force outcomes. Knowing whether there are gender differences in other countries and whether there is homogeneity in this effect between the European countries would help answer the question of whether the goal of a balanced labor force is influenced by informal care policies.

Some Swedish and Norwegian municipalities use user fees to cover parts of their care costs. Research in these two countries investigating the effect of these user fees in different municipalities will give more insight into the topic. There is already a study in Sweden from Socialstyrelsen (2005) finding that middle-income individuals who live alone refrain more from services than their counterparts in other income classes. Among individuals living together with someone, it is more common to refrain among those in the lower-income class. There are no previous studies on this topic in Norway. A larger user fee in a municipality may lead to a larger supply of informal care, pointing to a substitution effect of formal and informal care. In addition, user fees may affect men and women differently. Men could be more sensitive to price changes due to greater substitution possibilities because they receive help from their partner to a larger extent than women do (Höjgård and Mossler, 2001), while women may be more sensitive to price changes due to lower incomes.

To sum up, intensive elderly care has a statistically significant negative effect on employment while there is no effect of elderly care in general in Norway, Sweden, and Denmark. This thesis does not find any gender and country differences, and there seems to be no endogeneity problem in the Nordic countries.

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Appendix

Question on care posed to the respondents

Have you helped a family member, relative, friend, or neighbor who needs help in everyday life due to long-term illness, disability, or old age at least once a month during the past year (e.g., with cleaning, paperwork, personal care, or going outside)?

1. Yes, husband/wife/cohabitant/partner
2. Yes, children
3. Yes, parents/parents-in-law
4. Yes, other relative, friend or neighbor
5. No
6. If yes, how many hours a month?